

Inkom Kgp  
Telia Research AB

1999-01-07

# PATENT COOPERATION TREATY

PCT

## NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

PRAGSTEN, Rolf  
Telia Research AB  
Vitsandsgatan 9  
S-123 86 Farsta  
SUÈDE

Date of mailing (day/month/year) <b>23 December 1998 (23.12.98)</b>	
Applicant's or agent's file reference <b>Case 635 PCT</b>	<b>IMPORTANT NOTIFICATION</b>
International application No. <b>PCT/SE98/01975</b>	International filing date (day/month/year) <b>30 October 1998 (30.10.98)</b>
International publication date (day/month/year) <b>Not yet published</b>	Priority date (day/month/year) <b>04 November 1997 (04.11.97)</b>
Applicant <b>TELIA AB (PUBL) et al</b>	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed to Rule 17.1(c)** which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed to Rule 17.1(c)** which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
04 Nove 1997 (04.11.97)	9704020-8	SE	18 Dece 1998 (18.12.98)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer  Juan Cruz Telephone No. (41-22) 338.83.38
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## PATENT COOPERATION TREATY

PCT

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

PRAGSTEN, Rolf  
 Telia Research AB  
 Vitsandsgatan 9  
 S-123 86 Farsta  
 SUÈDE

Inkom Kgp  
 Telia Research AB

1999-05-25

Date of mailing (day/month/year)  
 14 May 1999 (14.05.99)

Applicant's or agent's file reference  
 Case 635 PCT

## IMPORTANT NOTICE

International application No. PCT/SE98/01975	International filing date (day/month/year) 30 October 1998 (30.10.98)	Priority date (day/month/year) 04 November 1997 (04.11.97)
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Applicant  
 TELIA AB (publ) et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
 EP,JP,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:  
 EE,LT,LV,NO

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 14 May 1999 (14.05.99) under No. WO 99/22575

## REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

## REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

J. Zahra

Telephone No. (41-22) 338.83.38

## INTERNATIONAL SEARCH REPORT

1

International application No.

PCT/SE 98/01975

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04L 12/56, H04L 29/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPDOC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0535860 A2 (AMERICAN TELEPHONE AND TELEGRAPH COMPANY), 7 April 1993 (07.04.93), column 2, line 12 - line 30, abstract, see the figures --	1-7
A	US 5481537 A (KENNETH J. CRISLER), 2 January 1996 (02.01.96), column 2, line 33 - column 6, line 12, figures 2-6, abstract --	1-7
A	EP 0478190 A2 (AMERICAN TELEPHONE AND TELEGRAPH COMPANY), 1 April 1992 (01.04.92), page 2, line 36 - line 58, abstract -- -----	1-7

 Further documents are listed in the continuation of Box C. See patent family annex.

## \* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 May 1999

Date of mailing of the international search report

27 -05- 1999

Name and mailing address of the ISA  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. + 46 8 666 02 86

Authorized officer

Johanna Lindqvist/MN  
Telephone No. + 46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

Information on patent family members

03/05/99

International application No.

PCT/SE 98/01975

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0535860 A2	07/04/93	CA	2072182 A,C	05/04/93
		JP	5219101 A	27/08/93
		US	5291481 A	01/03/94
US 5481537 A	02/01/96	BR	9501183 A	07/11/95
		CA	2142157 A	01/10/95
EP 0478190 A2	01/04/92	AU	632709 B	07/01/93
		AU	8456591 A	26/03/92
		CA	2050692 A,C	25/03/92
		JP	4227146 A	17/08/92
		US	5115430 A	19/05/92

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark  
Office  
(Box PCT)  
Crystal Plaza 2  
Washington, DC 20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 19 July 1999 (19.07.99)	
International application No. PCT/SE98/01975	Applicant's or agent's file reference Case 635 PCT
International filing date (day/month/year) 30 October 1998 (30.10.98)	Priority date (day/month/year) 04 November 1997 (04.11.97)
<b>Applicant</b>  MALMKVIST, Jonas et al	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

02 June 1999 (02.06.99)



in a notice effecting later election filed with the International Bureau on:

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2. The election  was

 was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer  Jean-Marie McAdams  Telephone No.: (41-22) 338.83.38
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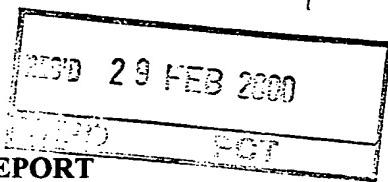
M.14

4

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Case 635 PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE98/01975	International filing date (day/month/year) 30.10.1998	Priority date (day/month/year) 04.11.1997
International Patent Classification (IPC) or national classification and IPC7 H 04 L 12/56, H 04 L 29/06		
Applicant Telia AB (publ) et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand  02.06.1999	Date of completion of this report  17.02.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Johanna Lindqvist/LS Telephone No. 08-782 25 00

**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

International application No.

PCT/SE98/01975

**I Basis of the report**

1. This report has been drawn on the basis of (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

- the international application as originally filed.
- the description, pages \_\_\_\_\_, as originally filed,  
pages \_\_\_\_\_, filed with the demand,  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- the claims, Nos. \_\_\_\_\_, as originally filed,  
Nos. \_\_\_\_\_, as amended under Article 19,  
Nos. \_\_\_\_\_, filed with the demand,  
Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.
- the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
sheets/fig \_\_\_\_\_, filed with the demand  
sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

- the description, pages \_\_\_\_\_
- the claims, Nos. \_\_\_\_\_
- the drawings, sheets/fig \_\_\_\_\_

3.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/01975

**V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

Novelty (N)	Claims	<u>1-7</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>1-7</u>	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	<u>1-7</u>	YES
	Claims	_____	NO

## 2. Citations and explanations

The claimed invention relates to a method at a data and telecommunications system for transmission of data streams between a receiving terminal and a transmitting terminal. The data streams are transmitted via at least one fixed network consisting of links with large variation in bandwidth and quality, at which a resource reservation protocol, RSVP, reserves resources for the data stream.

The invention is intended to provide multicast traffic without loading the fixed network without due cause. The protocol described in the invention attends to that, if the transmission capacity of a node decreases and the quality requirement of a specific data stream fails to be kept up, the data stream is thrown away. A message is transmitted from the overloaded node to the neighbouring nodes. This message includes the steps of updating the resource reservation, utilising the resource reservation temporarily for other traffic, and throwing the data stream until different is stated.

The cited documents in the International Search Report are:

EP, A2, 0535860

US, A, 5481537

EP, A2, 0478190

However, none of the documents discloses an invention with the above stated characteristics, which are expanded in claims 1-7. The claimed invention described in claims 1-7 would not transpire without any inventive work, even if a person skilled in the art had knowledge of any combination of the technical solutions described in the documents cited in the International Search Report.

.../..

**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

International application No.

PCT/SE98/01975

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V.

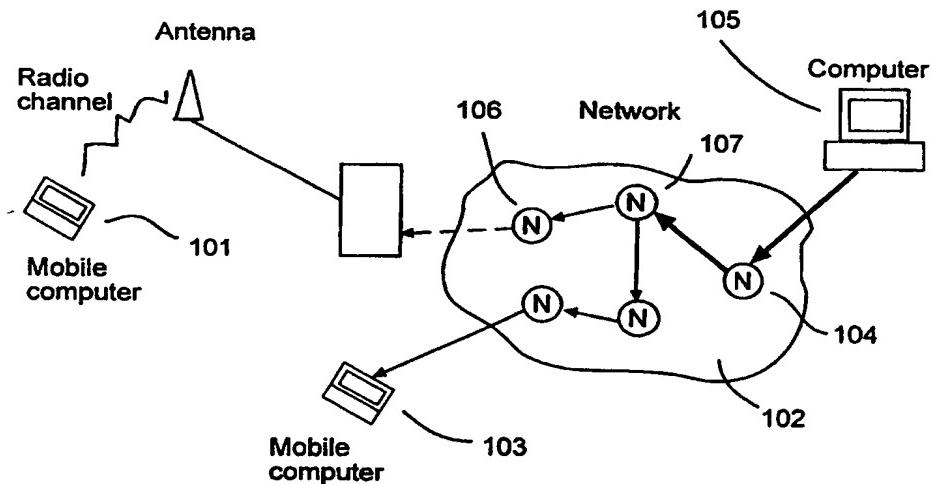
With this in mind, the invention described in claims 1-7 is novel and is not obvious to a person skilled in the art. As there will be no doubt about the usefulness of the invention, all the stipulated criteria under PCT Art. 33 are fulfilled.



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification :  Not classified	A2	(11) International Publication Number: WO 99/22575  (43) International Publication Date: 14 May 1999 (14.05.99)
(21) International Application Number: PCT/SE98/01975  (22) International Filing Date: 30 October 1998 (30.10.98)		(81) Designated States: EE, JP, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
(30) Priority Data: 9704020-8 4 November 1997 (04.11.97) SE		Published <i>Without international search report and to be republished upon receipt of that report.</i>
(71) Applicant (for all designated States except US): TELIA AB (publ) [SE/SE]; Märbackagatan 11, S-123 86 Farsta (SE).		
(72) Inventors; and (75) Inventors/Applicants (for US only): MALMKVIST, Jonas [SE/SE]; Spelvägen 6, bv, S-142 62 Trångsund (SE). SANDELL, Stefan [SE/SE]; Skorpionens gata 529,6, S-136 61 Haninge (SE).		
(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).		

(54) Title: RESOURCE OPTIMIZATION FUNCTION IN A DATA AND TELECOMMUNICATIONS SYSTEM



## (57) Abstract

The invention relates to a method at a telecommunications system and a data communications system which adapts resource reservation protocol for fixed networks (102) to radio networks with large variation in bandwidth and quality. At hierarchical coding, a data stream is divided into separate data streams with different priorities. By the resource reservation protocol, then resources in the fixed network (102) for the data streams are reserved. A node in the fixed network throws the data streams according to a predecided priority if the transmission capacity of the node decreases. If the transmission capacity at this node decreases, and the quality requirement of a data stream fails to be kept up, the data stream in question is thrown. After that, the node transmits a message to the nodes where the resource reservations are, towards the transmitter (105) with the following content: update the resource reservations for the data stream, i.e. keep the resource reservations which are required to transmit the data stream; use the reserved resource temporarily for other traffic; throw the data stream until different is stated.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
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CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Case 635 PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE98/01975	International filing date (day/month/year) 30.10.1998	Priority date (day/month/year) 04.11.1997
International Patent Classification (IPC) or national classification and IPC7 H 04 L 12/56, H 04 L 29/06		
Applicant Telia AB (publ) et al		

<ol style="list-style-type: none"> <li>This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</li> <li>This REPORT consists of a total of <u>4</u> sheets, including this cover sheet. <ul style="list-style-type: none"> <li><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</li> </ul> These annexes consist of a total of _____ sheets. </li> <li>This report contains indications relating to the following items: <ol style="list-style-type: none"> <li><input checked="" type="checkbox"/> Basis of the report</li> <li><input type="checkbox"/> Priority</li> <li><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Certain documents cited</li> <li><input type="checkbox"/> Certain defects in the international application</li> <li><input type="checkbox"/> Certain observations on the international application</li> </ol> </li> </ol>
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Date of submission of the demand 02.06.1999	Date of completion of this report 17.02.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5155 S-102 43 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Johanna Lindqvist/LS Telephone No. 08-782 25 00

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/01975

**I. Basis of the report**

1. This report has been drawn on the basis of (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

 the international application as originally filed. the description, pages \_\_\_\_\_, as originally filed,

pages \_\_\_\_\_, filed with the demand,

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

 the claims, Nos. \_\_\_\_\_, as originally filed,

Nos. \_\_\_\_\_, as amended under Article 19,

Nos. \_\_\_\_\_, filed with the demand,

Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,

Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_

 the drawings, sheets/fig \_\_\_\_\_, as originally filed,

sheets/fig \_\_\_\_\_, filed with the demand

sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,

sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_

2. The amendments have resulted in the cancellation of:

 the description, pages \_\_\_\_\_ the claims, Nos. \_\_\_\_\_ the drawings, sheets/fig \_\_\_\_\_

3.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/01975

**V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

Novelty (N)	Claims Claims	<u>1 - 7</u> <u>          </u>	YES NO
Inventive step (IS)	Claims Claims	<u>1 - 7</u> <u>          </u>	YES NO
Industrial applicability (IA)	Claims Claims	<u>1 - 7</u> <u>          </u>	YES NO

## 2. Citations and explanations

The claimed invention relates to a method at a data and telecommunications system for transmission of data streams between a receiving terminal and a transmitting terminal. The data streams are transmitted via at least one fixed network consisting of links with large variation in bandwidth and quality, at which a resource reservation protocol, RSVP, reserves resources for the data stream.

The invention is intended to provide multicast traffic without loading the fixed network without due cause. The protocol described in the invention attends to that, if the transmission capacity of a node decreases and the quality requirement of a specific data stream fails to be kept up, the data stream is thrown away. A message is transmitted from the overloaded node to the neighbouring nodes. This message includes the steps of updating the resource reservation, utilising the resource reservation temporarily for other traffic, and throwing the data stream until different is stated.

The cited documents in the International Search Report are:

EP, A2, 0535860  
 US, A, 5481537  
 EP, A2, 0478190

However, none of the documents discloses an invention with the above stated characteristics, which are expanded in claims 1-7. The claimed invention described in claims 1-7 would not transpire without any inventive work, even if a person skilled in the art had knowledge of any combination of the technical solutions described in the documents cited in the International Search Report.

.../..

**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**

International application No.

PCT/SE98/01975

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V.

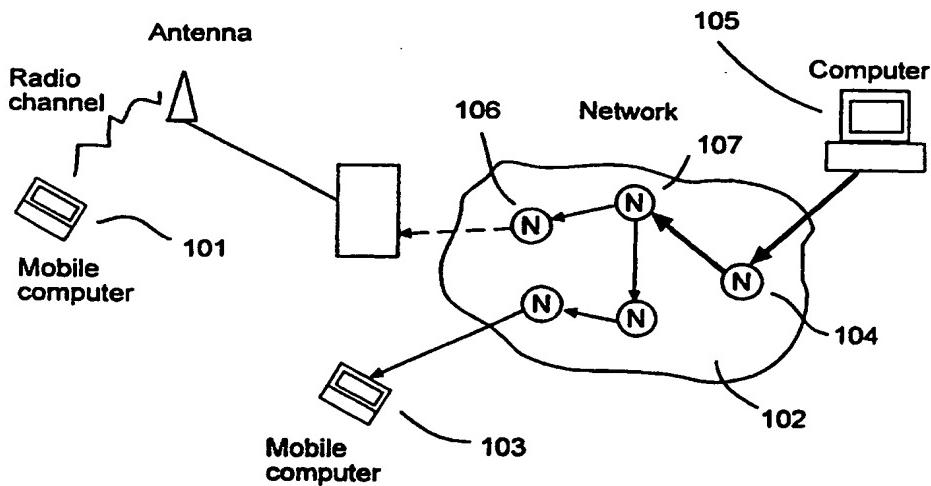
With this in mind, the invention described in claims 1-7 is novel and is not obvious to a person skilled in the art. As there will be no doubt about the usefulness of the invention, all the stipulated criteria under PCT Art. 33 are fulfilled.



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification :  H04L 12/56, 29/06		A3	(11) International Publication Number:  WO 99/22575
			(43) International Publication Date:  14 May 1999 (14.05.99)
(21) International Application Number:  PCT/SE98/01975		(81) Designated States: EE, JP, LT, LV, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date:  30 October 1998 (30.10.98)			
(30) Priority Data:  9704020-8 4 November 1997 (04.11.97) SE		Published <i>With international search report.</i>	
(71) Applicant (for all designated States except US): TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).		(88) Date of publication of the international search report:  5 August 1999 (05.08.99)	
(72) Inventors; and			
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(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).			

(54) Title: RESOURCE OPTIMIZATION FUNCTION IN A DATA AND TELECOMMUNICATIONS SYSTEM



## (57) Abstract

The invention relates to a method at a telecommunications system and a data communications system which adapts resource reservation protocol for fixed networks (102) to radio networks with large variation in bandwidth and quality. At hierarchical coding, a data stream is divided into separate data streams with different priorities. By the resource reservation protocol, then resources in the fixed network (102) for the data streams are reserved. A node in the fixed network throws the data streams according to a predecided priority if the transmission capacity of the node decreases. If the transmission capacity at this node decreases, and the quality requirement of a data stream fails to be kept up, the data stream in question is thrown. After that, the node transmits a message to the nodes where the resource reservations are, towards the transmitter (105) with the following content: update the resource reservations for the data stream, i.e. keep the resource reservations which are required to transmit the data stream; use the reserved resource temporarily for other traffic; throw the data stream until different is stated.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01975

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC6: H04L 12/56, H04L 29/06**

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## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC6: H04L**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**SE,DK,FI,NO classes as above**

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**WPI, EPDOC**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0535860 A2 (AMERICAN TELEPHONE AND TELEGRAPH COMPANY), 7 April 1993 (07.04.93), column 2, line 12 - line 30, abstract, see the figures --	1-7
A	US 5481537 A (KENNETH J. CRISLER), 2 January 1996 (02.01.96), column 2, line 33 - column 6, line 12, figures 2-6, abstract --	1-7
A	EP 0478190 A2 (AMERICAN TELEPHONE AND TELEGRAPH COMPANY), 1 April 1992 (01.04.92), page 2, line 36 - line 58, abstract -- -----	1-7

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

03/05/99

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PCT/SE 98/01975

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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## INTERNATIONAL SEARCH REPORT

1

International application No.

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## A. CLASSIFICATION OF SUBJECT MATTER

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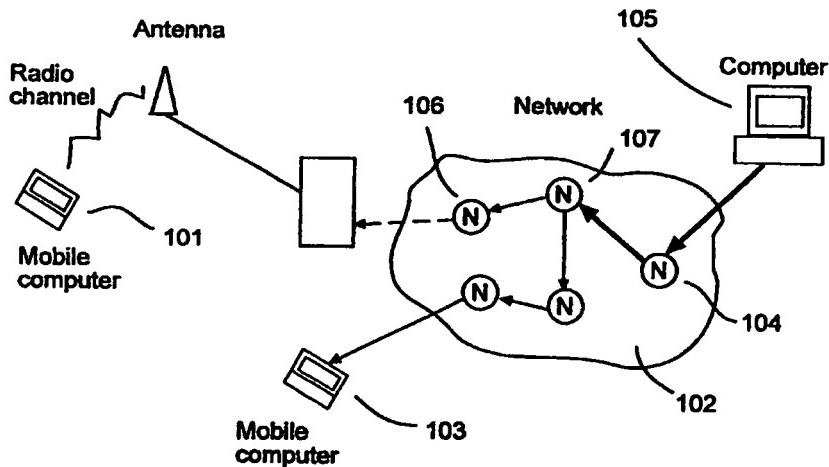
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		JP	4227146 A	17/08/92
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(57) Abstract

The invention relates to a method at a telecommunications system and a data communications system which adapts resource reservation protocol for fixed networks (102) to radio networks with large variation in bandwidth and quality. At hierarchical coding, a data stream is divided into separate data streams with different priorities. By the resource reservation protocol, then resources in the fixed network (102) for the data streams are reserved. A node in the fixed network throws the data streams according to a predecided priority if the transmission capacity of the node decreases. If the transmission capacity at this node decreases, and the quality requirement of a data stream fails to be kept up, the data stream in question is thrown. After that, the node transmits a message to the nodes where the resource reservations are, towards the transmitter (105) with the following content: update the resource reservations for the data stream, i.e. keep the resource reservations which are required to transmit the data stream; use the reserved resource temporarily for other traffic; throw the data stream until different is stated.

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TITLE OF THE INVENTION: RESOURCE OPTIMIZATION FUNCTION IN A  
DATA AND TELECOMMUNICATIONS SYSTEM

5 FIELD OF THE INVENTION

The present invention relates to a method at a data and telecommunications system for transmission of data streams between a receiving terminal and a transmitting terminal via at least one fixed network including just any 10 number of nodes and another network consisting of links with large variation in bandwidth and quality, at which a resource reservation protocol reserves resources in said fixed network for said data streams.

15 PRIOR ART

A computer transmits data over a network to a receiving computer. At hierarchical coding, a data stream (with real time requirements, i.e. demands on controlled delay) is divided into separate data streams with different 20 priorities. The data streams have different demands on quality. By a resource reservation protocol, resources then are reserved in the network for the data streams. Separate reservations are made for each data stream in all nodes from the receiver to the transmitter. At hierarchical 25 coding, the node throws data streams according to a predefined priority if the transmission capacity of the node has decreased. Since the data streams have real time demands, data will not be buffered.

When hierarchical coding is used over a radio channel 30 with large variation in bandwidth and quality, the number of data streams which can be transmitted over the radio channel will vary rapidly. The radio channel is the transmission link which in most cases will set a limit to the number of data streams that can be transmitted to the 35 receiver. The data streams that are stopped at the node closest to the radio channel are still transmitted in the

fixed network and therefore load the fixed network without due cause. At the same time, the receiver wants to keep its reservations in the network also during the time when some data streams are stopped, because the reservation may not

5 be possible to retrieve if it is deleted. At unicast traffic, i.e. one receiver of data streams and separate resource reservations for each receiver, it is possible to signal to the transmitter to stop the transmission of a data stream. At multicast traffic, i.e. a plurality of

10 receivers of the same data streams, resources are reserved in common in nodes with data streams in common. For that reason the transmitter cannot stop the transmission of a data stream since all other receivers then should be affected.

15 The aim of the present invention consequently is to solve this problem and provide multicast traffic without loading the fixed network without due cause.

#### SUMMARY OF THE INVENTION

20 This aim is achieved by a method at a data and telecommunications system for transmission of data streams between a receiving terminal and a transmitting terminal via at least one fixed network including just any number of nodes and another network consisting of links with large

25 variation in bandwidth and quality, where a resource reservation protocol reserves resources in said fixed network for said data streams, at which said protocol attends to that if the transmission capacity of a node decreases and falls below the quality requirements of a

30 specific data stream, said specific data stream is thrown, whereupon said node transmits a message which is executed in all nodes in said fixed network where resource reservations are provided towards said transmitting terminal, which message includes the steps of:

- updating said resource reservation for said specific data stream;
- utilizing said resource reservation temporarily for other traffic;
- throwing said specific data stream until different is stated.

10 The invention shows a plurality of advantages in comparison with known technology. For instance, the fixed network will, with this resource optimization function, have a considerable capacity improvement, i. e. the network will not be loaded by data which in any case is thrown at  
15 the node of lacking capacity.

The receiver will not lose its resource reservations during the time a data stream is stopped, which can happen if the receiver has to make new resource reservations each time the number of data streams is changed.

20 Resources which in other cases would not be utilized during the time a data stream is momentarily stopped, now can be utilized.

At multicast traffic, data will be thrown in a node as close to the transmitter as possible, without other  
25 receivers of the multicast traffic being affected.

Further characteristics of the present invention are given in the sub-claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

30 In the following a detailed description of an embodiment of the invention is given, with reference to the enclosed drawings, of which:

Figure 1 is a diagrammatical presentation of the tele and data communications system according to the invention;

Figure 2 is a diagrammatical presentation of a graph related to hierarchical coding according to the present invention.

5 DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

Figure 1 shows a mobile computer, 101, connected to a fixed network, 102, consisting of nodes (N) via a radio channel with varying quality. The dashed arrow shows data streams which are transmitted to the mobile node 101. The bold arrow shows data streams which are in common for all receivers 101 and 103.

The mobile computer 101 can receive unicast traffic and multicast traffic. At unicast traffic, the nodes deal with the resource reservations of the data streams separately. At multicast traffic, the nodes deal with the resource reservations in common when the data streams are in common for all receivers 101 and 103. In Figure 1, the node 104, closest to the receiver 105, deals with the resource reservations in common.

20 The invention is primarily intended for the functionality in the node 106 at the interface towards the radio network, and in the nodes 104 and 107 which the data streams pass on the path from the transmitter 105, i.e. the computer, to the receiver 101, i.e. the mobile computer.

25 The functionality adapts resource reservation protocols created for fixed networks 102 to networks consisting of links with larger variations in bandwidth and quality, preferably radio networks. Previously known technology does not deal with resource optimization at resource reservations and hierarchical coding over links with varying quality.

Theoretically, the resource optimization function solves the network utilization problem at hierarchical coding, both for unicast traffic and multicast traffic.

35 If the transmission capacity at a node (in most cases the node 106 at the radio channel), see Figure 1,

decreases, and the quality requirement of a data stream is no longer maintained, then the data stream in question will be thrown. After that the node transmits a message to the nodes (where the resource reservations are) towards the transmitter 105 (the computer in Figure 1) with the following content:

- Update the resource reservation for the data stream, i.e. keep the resource reservations that are required to transmit the data stream.
- Use the reserved resource temporarily for other traffic.
- Throw the data stream until different is stated.

If the transmission capacity in the node increases, and the quality requirement for a data stream is fulfilled, the data stream shall be transmitted again. The node transmits a message to the nodes (where the resource reservations are) towards the transmitter 105 with the following content:

- Update the resource reservation for the data stream, i.e. keep the resource reservations that are required for transmission of the data stream.
- Use the reserved resource for the intended data stream.

Both unicast and multicast traffic here are dealt with, with the same signalling message. At multicast traffic, resource reservations which are in common for a plurality of receivers 101 and 103 will not be affected.

Figure 2 shows the internal priority of the data streams, where the data stream 1 has the highest priority and is not limited in time by bandwidth functions.

Data streams 3 are strongly limited in time by the bandwidth function. The data streams consequently are

hierarchically coded, where data stream 1 is highest in the hierarchy.

In the following an example is given of a conceived scenario:

5

Mobile computer 101 receives data with real time demands (controlled delay) from a transmitting computer 105 (Figure 1).

10 The mobile computer 101 selects to receive the data stream in a plurality of data streams with different priorities (Figure 2).

15 In each node resources are reserved separately for each data stream.

The node 106 closest to the radio channel receives momentarily information about which transmission capacity that is available over the radio channel.

20 The bandwidth decreases, and the node 106 closest to the radio channel is forced to throw the lowest prioritized data stream (Figure 2).

25 In order not to overload the network 102 with data which in any case shall be thrown at the node 106, at the radio channel, a message is transmitted to the transmitter 105 (the computer) that it shall stop the transmission of the data stream of the lowest priority. The message which is transmitted to the transmitter 105 also contains the following information which is executed in all nodes 107 and 104 on the path to the transmitter 105:

- 30
- Update the resource reservation for the data stream, i.e. keep the resource reservations that are required to transmit the data stream.
  - Use the reserved resource temporarily for other traffic.
  - Throw the data stream until different is stated.
- 35

Both unicast and multicast traffic here are dealt with, with the same signalling message. In the cases when the resources reservation is in common, all subjacent nodes must require that certain data streams be stopped for this request being forwarded in the common reservation. Consequently the data streams will not always be thrown in the nodes 104 where the resource reservation is in common.

The bandwidth will increase and the node 106 closest to the radio channel decides that the data stream of the lowest priority again can be received.

A message is transmitted to the transmitter 105 that the data stream of the lowest priority shall be transmitted.

The message which is transmitted to the transmitter 105 contains the following information which is executed in all nodes 107 and 104 on the path to the transmitter 105.

- Update the resource reservation for the data stream, i.e. keep the resource reservations which are required to transmit the data stream.
- Use the reserved resource for the intended data stream.

The above mentioned is only to be regarded as an advantageous embodiment of the present invention, and the extent of protection is only defined by what is indicated in the following patent claims.

## PATENT CLAIMS

1. Method at a data and telecoomuncations system for transmission of data streams between a receiving terminal (101) and a transmitting terminal (105) via at least one fixed network (102) including just any number of nodes and another network consisting of links with large variation in bandwidth and quality, at which a resource reservation protocol reserves resources in said fixed network (102) for said data streams, characterized in that said protocol attends to that, if the transmission capacity of a node, preferably the node (106) closest to said other network, decreases, and the quality requirement of a specific data stream fails to be kept up, said specific data stream is thrown, whereupon said node by means of said protocol transmits a message which is executed in other nodes where said resource reservations are, to said transmitting terminal (105), which message includes the steps of:
  - updating said resource reservation for said specific data stream;
  - utilizing said resource reservation temporarily for other traffic;
  - throwing said specific data stream until different is stated.
2. Method according to patent claim 1, characterized in that if the transmission capacity in said node increases and the quality requirement for said specific data stream is fulfilled, said specific data stream shall be transmitted again, at which said node by means of said protocol transmits a message to said second nodes, where said resource reservations are, towards

said transmitting terminal (105), which message includes the steps of:

- updating the resource reservation for said specific data stream;
- using said resource reservation for said specific data stream.

10 3. Method according to patent claim 1 or 2, characterized in that said other network is a radio network including at least one radio channel.

15 4. Method according to patent claim 3, characterized in that said node constitutes an interface towards said radio channel, at which said radio channel sets the limit regarding how many data streams that can be transmitted from said transmitting terminal (105) to said receiving terminal (101).

20 5. Method according to some of the previous patent claims, characterized in that it is utilized at hierarchical coding of said data streams.

25 6. Method according to patent claim 1, characterized in that, at multicast traffic, said specific data stream in said other node as close to said transmitting terminal (105) as possible, is thrown without other receiving terminals (103) of the multicast 30 traffic being affected, whereby said fixed network (102) is not loaded by said specific data stream, which in any case is thrown at said node lacking capacity.

35 7. Method according to some of the previous patent claims, characterized in that said node in said fixed network (102) which constitutes radio interface towards

said radio channel receives momentary information about  
which transmission capacity that is available on said radio  
channel, at which said node by means of said protocol  
reserves resources in said fixed network regarding the  
5 transmission capacity of said radio channel.

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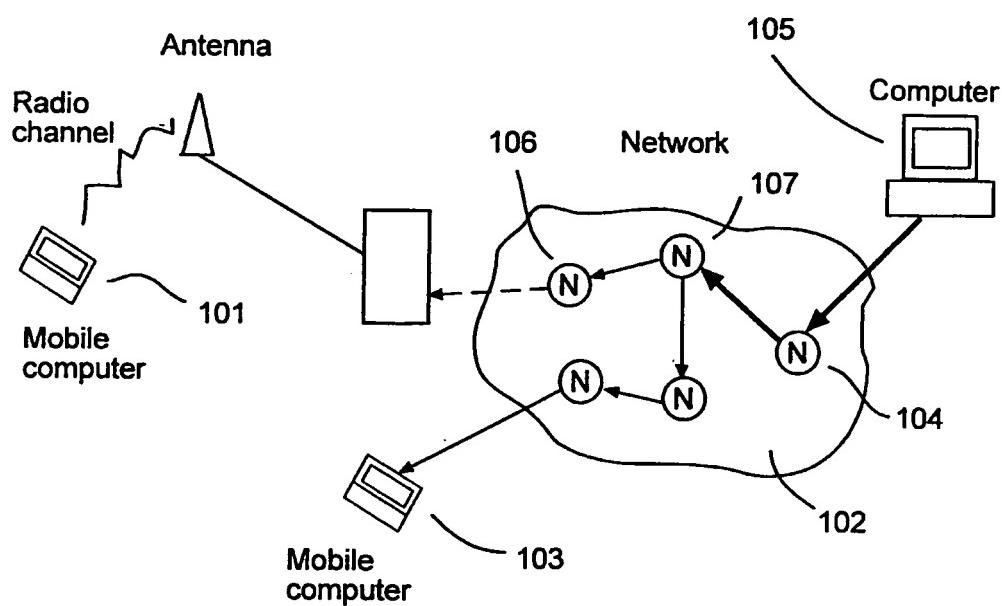


Figure 1

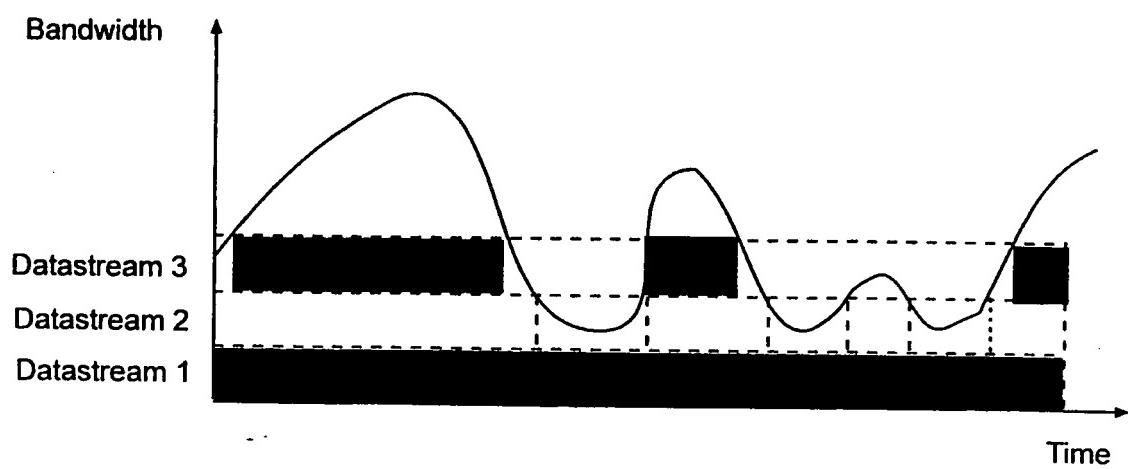


Figure 2